

Camel Milk and Diabetes: Science-Backed Benefits for Type 1 and Type 2 Patients

Research prepared by CamelWay – supplier of premium camel milk in Europe & UK

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Camel milk has been used traditionally for its medicinal properties and is now being studied as a complementary therapy for diabetes. Scientific research indicates that camel milk can improve blood sugar control, reduce insulin requirements, and benefit overall health in diabetic patients. [1][2]

Camel Milk vs. Cow Milk: Key Nutritional Differences

Camel milk is often touted as a healthier alternative to cow's milk, and research confirms several notable differences in composition and benefits:

- **Higher Nutrient Content:** Camel milk is rich in certain vitamins and minerals. For example, it contains **3–5 times more vitamin C** than cow's milk[3]. It also provides higher levels of **iron, zinc, and other trace minerals**, which can be beneficial for people with diabetes (who often need antioxidant support). However, it has somewhat lower levels of vitamin A, B1, and B2 compared to cow milk[4][3]. Overall, camel milk's unique nutrient profile contributes to its health benefits. (PMID: 8117065, 29026408)
- **Healthier Fat Profile:** Camel milk contains **less saturated fat and cholesterol** and a greater proportion of **unsaturated fatty acids** than cow's milk[5]. This heart-healthy fat profile means camel milk may be better for managing cholesterol levels. In fact, its lower cholesterol and higher polyunsaturated fat content give camel milk a potential advantage for improving the lipid profile (fats in the blood) of those with diabetes[5]. (PMID: 29026408)
- **Lower Allergenicity & Easier Digestion:** Camel milk **lacks β -lactoglobulin**, the major allergenic whey protein in cow milk[6]. This makes camel milk naturally hypoallergenic and easier to tolerate for many people with cow milk sensitivity. Its casein protein is predominantly beta-casein (similar to the A2 milk variant), which is more digestible and less likely to cause inflammation or intolerance[7][6]. Additionally, camel milk has smaller fat globules and different whey proteins (high in lactoferrin, immunoglobulins, lysozyme, etc.) that may aid digestion and provide immune benefits[8][9]. Many individuals who cannot handle cow's milk report that camel milk is gentler on their digestive system.
- **Insulin-Like Proteins:** Uniquely, camel milk contains insulin and insulin-like proteins that are not present in significant amounts in cow milk[10]. These bioactive molecules in camel milk have raised much interest because they might directly affect blood glucose regulation. Researchers estimate that camel milk can contain about **52 units of insulin per liter**, and unlike bovine insulin, camel milk insulin is encapsulated in nano-particles that may protect it from stomach acid, potentially allowing it to be absorbed intact in the gut[10]. While there is some debate (since digestive enzymes can break down proteins), the presence of these insulin-like factors is a key reason camel milk is being explored for diabetes management. (PMID: 17320238, 29026408)

Bottom line: Camel milk's nutritional profile – higher in vitamin C and antioxidants, more unsaturated fats, different proteins, and containing insulin-like compounds – gives it **unique**

therapeutic potential for metabolic health. These differences lay the foundation for why camel milk may benefit people with diabetes more than regular cow's milk.

Camel Milk Benefits for Type 1 Diabetes (T1D)

Type 1 diabetes is an autoimmune condition in which the pancreas produces little to no insulin. Insulin injections are required for survival, but researchers have investigated camel milk as a complementary therapy to improve glycemic control and possibly reduce the amount of insulin needed. **Multiple scientific studies – including randomized controlled trials – have shown striking benefits of camel milk in people (especially children and young adults) with type 1 diabetes:**

- **Better Blood Sugar Control:** Regular consumption of camel milk can lead to significant reductions in blood glucose levels and HbA1c (a long-term blood sugar marker). In a 16-week randomized trial, 27 young adults with type 1 diabetes who drank 500 mL of camel milk daily (in addition to standard insulin therapy) saw their **fasting blood sugar drop by more than half** (from an average ~227 mg/dL to ~99 mg/dL) and HbA1c decrease from 9.6% to 7.2%[\[1\]](#). By comparison, the control group on standard care had higher glucose (~227 mg/dL) and HbA1c (~9.6%) at the end of the study. This means the camel milk group achieved much tighter glucose control, with average HbA1c falling near the **target range of around 7%**. (PMID: 19459752)
- **Reduced Insulin Requirements:** Perhaps the most remarkable finding is that camel milk can **significantly cut the needed insulin dose** for type 1 diabetics. In the 16-week study above, patients adding camel milk were able to reduce their daily insulin injections by about 50% (from ~48 units/day to 23 units/day on average) while maintaining better control[\[11\]](#). Another long-term **2-year randomized trial** in 24 type 1 diabetic patients found similar results: the camel milk group's insulin doses dropped from ~32 U/day to ~17 U/day over time[\[12\]](#). Amazingly, **25% of the patients in that study no longer needed any injected insulin at all by the end** – they maintained normal blood sugar using camel milk and diet alone[\[12\]](#). In contrast, the control group continued to require around 30+ units of insulin daily. This indicates that camel milk, as an adjunct therapy, can restore sufficient glycemic balance to substantially **spare the external insulin requirement** in some individuals. (PMID: 21629270)
- **Improvement in C-Peptide and Beta-Cell Function:** C-peptide is a marker of the body's own insulin production. Higher C-peptide levels indicate that the pancreas is still producing some insulin. Remarkably, camel milk interventions have been linked to **increases in C-peptide**, suggesting a restoration or preservation of pancreatic beta-cell function. In the 16-week trial, the camel milk group's C-peptide rose nearly ten-fold (from 0.28 to 2.3 pmol/mL)[\[13\]](#), whereas one would expect little to no C-peptide in longstanding type 1 diabetes. Similarly, a one-year study in 50 young new-onset type 1 patients showed that camel milk users had a **12% increase in C-peptide levels** alongside better glucose control[\[14\]](#). These findings hint that camel milk might help regenerate or protect insulin-producing cells in the pancreas, an effect not seen with insulin injections alone. While more research is needed, this raises hope that camel milk could prolong the "honeymoon period" or residual beta-cell activity in type 1 diabetes. (PMID: 19459752, 17320238)

- **Lower Autoimmunity and Complications Markers:** Camel milk's benefits in type 1 diabetes go beyond sugars and insulin. In the 16-week study, those drinking camel milk had a **reduction in anti-insulin antibodies** (a marker of autoimmunity) compared to the control group[1]. They also showed improvements in markers of kidney function: **24-hour urinary albumin excretion** (an indicator of diabetic nephropathy) was significantly lower in the camel milk group (about 14.5 vs 25.2 mg/24h)[1]. In fact, a separate study focusing on diabetic nephropathy found that adding camel milk for 6 months led to **improvement in microalbuminuria** (early kidney damage) in type 1 patients[15]. Although blood glucose didn't change much in that short nephropathy study, patients required less insulin and had better lipid profiles while on camel milk[16]. These results suggest camel milk may protect against or slow down diabetes complications such as kidney disease, likely due to its anti-inflammatory and antioxidant components (discussed later). (PMID: 19459752, 19848050)
- **Quality of Life:** Improved diabetes control with camel milk may translate to better daily well-being. While specific quality-of-life metrics are not always reported, patients in studies often experienced fewer hyperglycemic episodes when on camel milk, and families reported relative ease of integrating it into diets. Any therapy that reduces the burden of frequent insulin shots and dangerously high or low sugars can greatly improve a type 1 diabetic's quality of life.

Overall, **camel milk shows great promise as an adjunct therapy for type 1 diabetes**. Research in young T1D patients consistently demonstrates **lower blood sugar levels, lower HbA1c, and dramatically reduced insulin needs** when camel milk is added to the treatment regimen[2][1]. These improvements suggest better day-to-day control and possibly a protective effect on the pancreas. It is important to note that these studies used **about 500 mL of camel milk per day** as the effective dose, and the benefits became evident within a few months. Camel milk should *not* be seen as a standalone cure – patients still used insulin, just less of it – but as a **powerful complementary strategy**. Doctors in some regions (like India and the Middle East) have started to encourage type 1 diabetic patients to drink camel milk in addition to standard insulin therapy, given its safety and observed benefits. (PMID: 21629270, 19459752)

Camel Milk Benefits for Type 2 Diabetes (T2D)

Type 2 diabetes is characterized by insulin resistance (the body's tissues don't respond properly to insulin) and often elevated blood lipid levels. The primary goals in Type 2 diabetes management are to improve insulin sensitivity, control blood sugar spikes, and reduce cardiovascular risk factors. Though fewer studies have been done compared to type 1, **emerging research indicates that camel milk can also benefit type 2 diabetics through multiple pathways:**

- **Improved Fasting Glucose and A1c:** Regular consumption of camel milk has been shown to lower blood sugar in type 2 diabetes. In one randomized placebo-controlled trial, 14 adults with type 2 diabetes supplemented with camel milk powder (about 20 grams per day) for 4 weeks saw their **fasting blood glucose drop significantly**, from an average of 118 mg/dL down to 93 mg/dL[17]. Two-hour post-meal glucose levels also improved compared to the control group (which received cow milk powder)[18]. Although 4 weeks is a short period, this hints that camel milk can rapidly enhance

glycemic control in T2D. Another study in 20 type 2 diabetic adults over 2 months showed trends of lower fasting glucose and HbA1c in the camel milk group, though the changes were not statistically significant likely due to the small sample[19]. However, when researchers pooled data from multiple trials, the benefits become clearer: A recent meta-analysis including **10 RCTs with over 340 diabetic patients** found that **camel milk significantly decreases blood glucose levels and HbA1c** on average compared to controls[20]. In practical terms, this means better day-long blood sugar control for those drinking camel milk regularly. (PMID: 34401094, 38049802)

- **Enhanced Insulin Sensitivity and Lower Insulin Resistance:** One of the most valuable effects of camel milk in type 2 diabetes is improving the body's response to insulin. Several studies report a **reduction in insulin resistance** with camel milk. For instance, in a study of insulin-treated T2D patients, those receiving camel milk had a greater improvement in HOMA-IR (a measure of insulin resistance) than those on cow's milk[21]. The aforementioned meta-analysis (PMID: 38049802) noted an **"impressive improvement in insulin sensitivity"** among diabetic patients regularly consuming camel milk[20]. In simpler terms, camel milk seems to help the body's own insulin work better. This is consistent with an earlier finding that two months of drinking camel milk (500 mL/day) improved insulin sensitivity in adults with type 2 diabetes[22] (the effect was not seen in the control group). Improved insulin sensitivity means lower insulin levels are needed to manage blood sugar, easing strain on the pancreas. (PMID: 38049802)
- **Cholesterol and Lipid Improvements:** People with diabetes often have co-existing dyslipidemia (high "bad" cholesterol and triglycerides), which contributes to heart disease risk. Camel milk may offer cardiovascular benefits by improving the lipid profile. A **2023 systematic review and meta-analysis** concluded that camel milk consumption led to statistically significant **reductions in total cholesterol (~21.7 mg/dL), triglycerides (~19.8 mg/dL), and LDL (bad cholesterol, ~11.9 mg/dL)**, along with an **increase in HDL (good cholesterol, +10.4 mg/dL)** on average[23][24]. These changes are quite meaningful for reducing cardiovascular risk in diabetics. Notably, the meta-analysis found the lipid benefits were more pronounced in type 1 diabetics than type 2, and mainly observed in longer-term use (>6 months)[25]. Still, even type 2 patients show trends of improved cholesterol. For example, in a placebo-controlled trial, those taking camel milk powder had a **significant drop in total cholesterol levels** compared to the control group after 1 month[18]. Another small trial in type 2 diabetics reported reduced triglycerides and total cholesterol, and a need for lower doses of lipid-lowering medication, when camel milk was added[26]. By helping normalize blood lipids, **camel milk can support heart health in diabetes**. (PMID: 37267949, 34401094)
- **Weight Management and Metabolic Syndrome Factors:** While direct effects on weight loss are not yet well-documented, improved insulin sensitivity and lipid profiles indirectly aid weight management. Camel milk is relatively low in calories and saturated fat, and some animal studies suggest it may reduce weight gain in diabetic models[27]. In metabolic syndrome animal models, camel milk has shown anti-obesity and anti-inflammatory effects[28][29]. More research in humans is needed, but these properties could benefit overweight type 2 diabetics by addressing multiple components of metabolic syndrome (high blood sugar, high cholesterol, central obesity, etc.).

- **Blood Pressure and Circulation:** Camel milk contains potassium and other nutrients that support healthy blood pressure, though specific studies on hypertensive diabetics are scarce. One small study noted no change in blood pressure after 2 months of camel milk in type 2 diabetics[30]. However, improvements in insulin resistance and cholesterol can in the long run contribute to better vascular health. Additionally, the presence of bioactive peptides with ACE-inhibitory (blood pressure-lowering) activity has been identified in camel milk[31], suggesting potential benefits for blood pressure that merit further investigation.

In summary, **camel milk can be a valuable adjunct for type 2 diabetes management**. Regular intake has been associated with **lower blood sugar levels, improved insulin action, and a healthier lipid profile**[20][23]. These translate to better glycemic control and possibly reduced risk of diabetic complications like heart disease. Camel milk is not a replacement for standard therapy (diet, exercise, oral medications or insulin as prescribed), but it can complement these treatments. Importantly, studies have found camel milk to be **safe and well-tolerated** in diabetic patients, with no reports of hypoglycemia or adverse effects when combined with usual care[32]. Always consult with a healthcare provider, but based on current science, adding ~500 mL of camel milk daily could be a **natural strategy to help “fine-tune” blood sugar and cholesterol levels** in type 2 diabetes. (PMID: 34401094, 37267949)

How Does Camel Milk Help Fight Diabetes? (Mechanisms)

It's fascinating that a natural food like camel milk can have medicinal effects in diabetes. Scientists have been uncovering several **mechanisms** behind the anti-diabetic action of camel milk. Here are the key ways camel milk works in the body to benefit diabetic patients:

- **Insulin and Insulin-Like Proteins:** Camel milk is often called a “**natural insulin**” because it contains high levels of insulin-like peptides. Research suggests camel milk has a unique form of insulin that **resists digestion in the stomach** and can be absorbed in the intestine intact[10]. Unlike cow milk, camel milk doesn't form dense curds in the stomach – its proteins (including insulin) remain in a liquid state, potentially facilitating absorption[33]. Additionally, camel milk contains small peptides that can bind to insulin receptors and mimic insulin's action[34]. The net effect is that drinking camel milk may directly lower blood glucose by providing an insulin-like activity in the bloodstream. This explains why patients on camel milk often see improved blood sugar without increasing their injected insulin doses. Some experts estimate that consuming 0.5 liters of camel milk could provide a significant insulin-equivalent effect for glycemic control (though it varies by individual). (PMID: 29026408)
- **Boosting Pancreatic Function:** Beyond supplying external insulin, camel milk appears to **stimulate the pancreas to produce more of its own insulin**. This is evidenced by higher C-peptide levels and even some patients reducing or stopping insulin injections when on camel milk[12]. In animal studies, camel milk has shown an ability to **repair and regenerate pancreatic beta-cells**. A study in diabetic rats (PMID: 40046795) found that camel milk significantly improved pancreatic beta-cell **structure and function**, leading to increased insulin secretion and better glucose utilization[35]. Camel milk's proteins (like lactoferrin and albumin) might act as growth factors for beta-cells or reduce the autoimmune attack on these cells in type 1 diabetes. In simpler terms, camel milk

may help the pancreas heal or work more efficiently, which is an extraordinary benefit not seen with standard treatments alone.

- **Improving Insulin Sensitivity:** Camel milk can make the body's insulin work better – i.e., reduce insulin resistance. Components in camel milk (such as magnesium, zinc, and certain fatty acids) are known to enhance insulin receptor function. Recent research from 2021 demonstrated that **camel milk raised levels of GLP-1** (glucagon-like peptide-1) in type 2 diabetic patients[29][36]. GLP-1 is a gut hormone that increases insulin secretion and improves insulin sensitivity. By boosting GLP-1, camel milk helps muscle and fat cells respond more to insulin, thus lowering blood sugar. Additionally, an interesting finding from the same study was that camel milk **altered the gut microbiome** in a beneficial way[37]. It increased certain probiotic bacteria (like *Clostridium* and *Eubacterium* species) that are linked to improved metabolism. A healthier gut microbiome can reduce inflammation and insulin resistance. Essentially, camel milk works through multiple channels – hormonal and microbial – to make the body more insulin-sensitive.
- **Anti-Inflammatory and Immune Modulation:** Chronic inflammation plays a role in both type 1 (autoimmune attack on pancreas) and type 2 (inflammation-induced insulin resistance) diabetes. Camel milk is rich in **anti-inflammatory compounds**. Notably, it contains **lactoferrin**, a protein that can inhibit pro-inflammatory cytokines like TNF- α , IL-1, and IL-6[38]. Camel milk consumption has been shown to **lower levels of inflammatory markers** in the body[39]. By calming inflammation, camel milk may protect insulin-producing cells from immune damage in type 1 diabetes, and improve insulin signaling in type 2. There's also evidence that camel milk can downregulate iNOS (inducible nitric oxide synthase)[40], an enzyme that mediates inflammation and tissue damage. This broad anti-inflammatory effect can help prevent the progression of diabetic complications in organs like kidneys, eyes, and nerves.
- **Antioxidant Effects:** Diabetes is associated with oxidative stress – high blood sugar causes excessive free radicals that damage cells. Camel milk has a strong **antioxidant capacity**. It is a good source of vitamins C and E, as well as **trace elements like zinc and selenium** that are cofactors for antioxidant enzymes[41]. Camel milk's whey proteins can elevate glutathione levels (the body's master antioxidant)[42]. By scavenging free radicals, camel milk prevents oxidative damage to tissues. This is particularly important in preventing LDL cholesterol oxidation (a factor in heart disease) and protecting pancreatic beta-cells from oxidative apoptosis (cell death). Studies note that **high antioxidant levels in camel milk** likely contribute to its cholesterol-lowering and cell-protective effects[43][44]. In summary, camel milk acts like a natural antioxidant supplement, which is highly beneficial in diabetes management.
- **Enhanced Lipid Metabolism:** Camel milk's impact on cholesterol and triglycerides is not just a secondary effect – it also has specific components that improve lipid metabolism. The healthier fat profile (more unsaturated fats) in camel milk can modulate cholesterol synthesis in the liver. Moreover, fermented camel milk releases bioactive peptides that have been shown to **inhibit enzymes like pancreatic lipase**, potentially reducing fat absorption, and to upregulate receptors that clear cholesterol from the

blood[10][45]. Combined with its insulin-sensitizing properties, this means camel milk helps the body handle fats more efficiently, translating to better lipid profiles as observed in clinical studies.

Each of these mechanisms works synergistically. To put it simply, **camel milk provides a multifaceted attack on diabetes**: it supplies extra insulin or insulin-like effect, helps your own pancreas work better, makes your body more receptive to insulin, and shields your cells from inflammatory and oxidative damage. This is why researchers often refer to camel milk as a **“functional food” or “natural medicine” for diabetes**[46][47]. It’s not just nutrition; it actively helps correct the metabolic imbalances in diabetes. While more research is ongoing to fully understand these mechanisms, the current evidence strongly supports camel milk’s role in diabetes care. (PMID: 34401094, 29026408)

CamelWay – Premium Camel Milk Powder in Europe and the UK

When considering adding camel milk to your diabetes regimen, quality and safety of the product are paramount. **CamelWay** is a leading provider of **premium camel milk powder** in Europe and the UK, known for its high standards and EU-certified quality. Here are a few key points about CamelWay and why it’s a trusted source:

- **Highest Quality & Safety:** CamelWay sources its milk from **certified farms in Dubai** that adhere to rigorous quality controls. The production facilities carry ISO certifications and even a special EU permit for export, meaning they meet all European Union health and safety regulations for dairy products[48]. Every batch is tested to ensure purity and potency. This is crucial because raw camel milk can harbor pathogens if not handled properly – CamelWay’s powder undergoes safe pasteurization and gentle drying to eliminate risks while preserving nutrients.
- **EU-Certified Product:** CamelWay’s camel milk powder is fully **EU-certified**, which gives consumers peace of mind about its **safety and legitimacy**. It complies with European food standards and has been approved for sale across the EU and UK. From Halal certification to BRC (global food safety standard) compliance, the product checks all the boxes[48]. In practical terms, this means the milk powder is free from harmful additives, contaminants, and has accurate nutritional labeling. Diabetic individuals can confidently use CamelWay’s camel milk powder knowing it’s a clean and reliable product.
- **Convenience and Availability:** As a **powdered form**, CamelWay’s camel milk is easy to store, transport, and use. The powder can be reconstituted by simply mixing with water, making a fresh glass of camel milk in seconds. This is much more convenient for many people in Europe/UK who don’t have access to fresh camel milk locally. CamelWay offers its powder in 300g resealable pouches (and larger bulk packs), which ensures a decent supply. The long shelf-life of the powder means you can incorporate camel milk into your daily routine without worrying about quick spoilage – an advantage for consistent use. They also provide fast shipping across Europe and Great Britain[49], so obtaining this supplement is hassle-free.

- **Trusted Brand and Ethical Practices:** Established in 2019, CamelWay is a family-managed brand that prides itself on **ethical and sustainable practices**. The camels are raised with low-stress care (important for quality milk), and no hormones or antibiotics are unnecessarily used. By focusing on animal welfare and product integrity, CamelWay ensures that the camel milk powder retains its natural goodness. Many healthcare practitioners and nutritionists in Europe are now aware of CamelWay as a reputable source when recommending camel milk to patients.

In short, **CamelWay's camel milk powder** offers the benefits of camel milk in a **safe, high-quality form** that's accessible to consumers in Europe and the UK. For anyone intrigued by the science we've discussed – whether you're a person with diabetes looking to improve your health, or just a health-conscious individual – CamelWay provides a convenient way to try camel milk therapy with confidence. The combination of **premium quality** and **scientific backing** makes it an excellent choice for integrating camel milk into a modern, healthy lifestyle.

(CamelWay – certified premium camel milk supplier in EU/UK[48])

Conclusion

Camel milk, often termed “white gold” in desert cultures, has emerged in modern research as a **promising adjunct therapy for diabetes**. The **science-backed benefits** are substantial: improved blood sugar control, reduced insulin resistance, lower cholesterol levels, and even a reduction in required insulin doses for type 1 diabetics[2][23]. These effects are attributed to camel milk's unique nutritional and biochemical profile – it naturally contains insulin-like proteins, is rich in antioxidants, and has anti-inflammatory and immunomodulatory properties[10][43]. For individuals with **Type 1 diabetes**, adding camel milk to the diet can support better glycemic control and potentially preserve pancreatic function, while those with **Type 2 diabetes** may experience easier blood sugar management and cardiovascular benefits. Crucially, these outcomes are supported by peer-reviewed studies in humans (as well as corroborating animal research), with citations in PubMed ranging from clinical trials to meta-analyses (PMID: 21629270, 34401094, 37267949).

It's important to emphasize that camel milk is **not a standalone cure** for diabetes – patients should continue to follow medical advice including medications, insulin therapy, diet, and exercise. However, as a **functional food**, camel milk can be a powerful complementary addition. It is generally safe, with no reported side-effects in studies besides the normal lactose content (diabetics with lactose intolerance should be cautious, though camel milk's composition often makes it more tolerable than cow milk). The typical effective intake in research has been **500 mL per day**, but individuals may start with smaller amounts and increase gradually, monitoring their blood glucose as they do so.

In the realm of holistic and nutritional approaches to diabetes, **camel milk stands out for its robust scientific validation**. Traditional wisdom in Middle Eastern and Asian cultures held that camel milk could “sweeten” the blood (i.e., control diabetes), and modern science is validating these claims[46]. With products like CamelWay's premium camel milk powder now available, people even far from camel-rearing regions can access this therapeutic beverage. If you're looking to **naturally support your diabetes management** or improve your metabolic health,

camel milk is certainly worth considering – and ongoing research will undoubtedly shed even more light on its benefits in the near future.

Key Takeaway: Camel milk offers a unique blend of nutritional and pharmacological properties that can help in managing both type 1 and type 2 diabetes. Its use is backed by scientific studies (PubMed IDs provided for reference), which show *real, measurable improvements* in diabetic health markers. Incorporating camel milk (from a safe, certified source) into a diabetic diet could be a game-changer for many, providing a natural boost towards better health and quality of life. **In the fight against diabetes, camel milk is no longer just folklore – it's a scientifically supported ally.** (PMID: 29026408)

Sources: The information above is based on numerous scientific studies and reviews, including publications in *Journal of Medical Food*, *European Journal of Clinical Nutrition*, *International Journal of Endocrinology and Metabolism*, and others[1][2][46][23]. All facts and statistics are drawn from peer-reviewed research indexed on PubMed, ensuring that this report reflects the **current knowledge of science** on camel milk and diabetes.

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